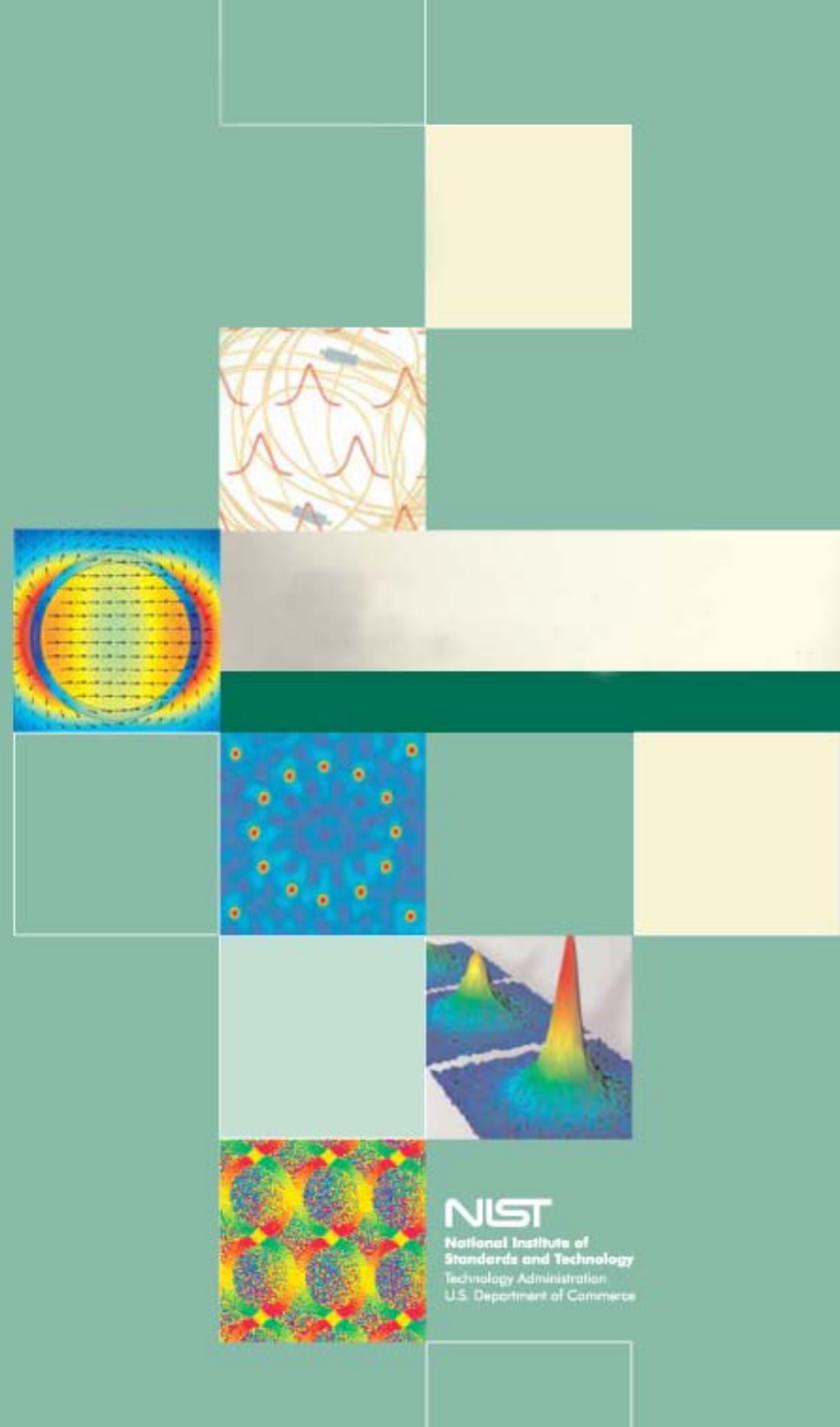


OVERVIEW OF PARTNERSHIPS WITH THE JOINT QUANTUM INSTITUTE (JQI) AND JILA

Presentation for
Visiting Committee on
Advanced Technology

June 10, 2008

Katharine B. Gebbie
Director, Physics Laboratory

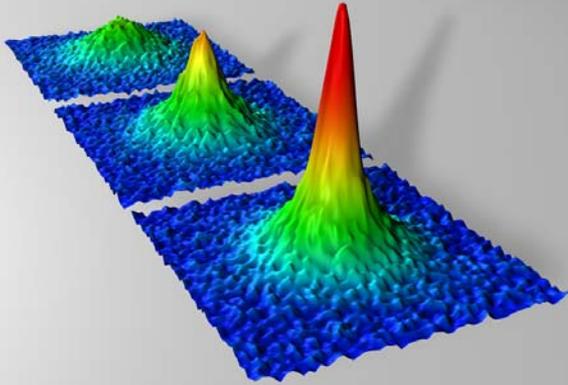


NIST
National Institute of
Standards and Technology
Technology Administration
U.S. Department of Commerce

Benefits of Partnerships

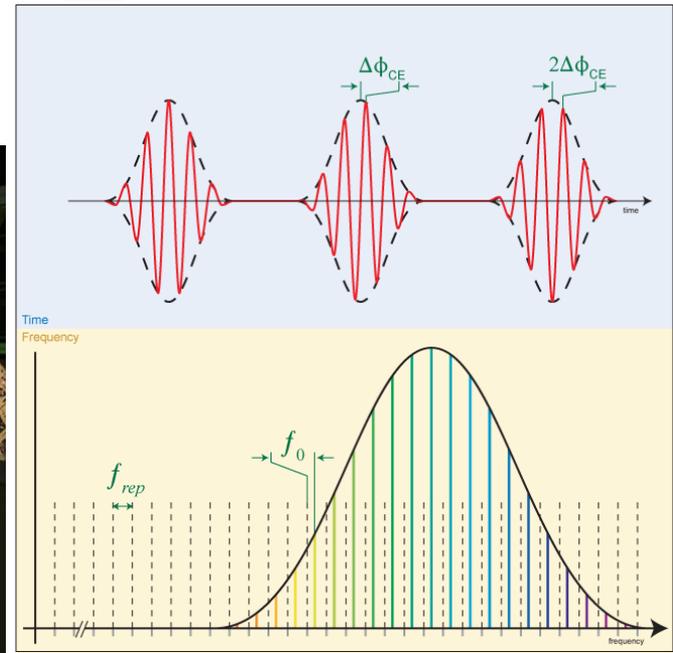
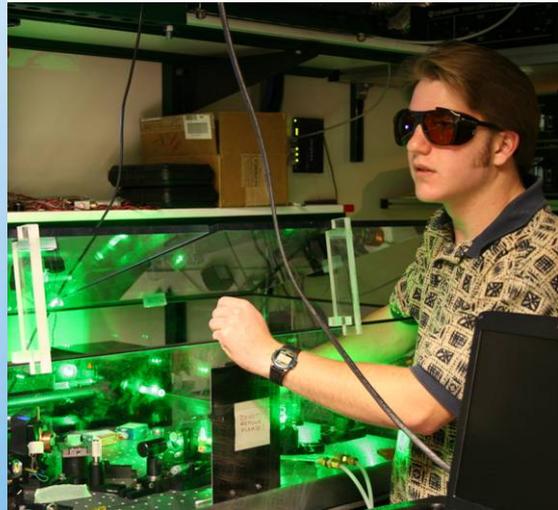
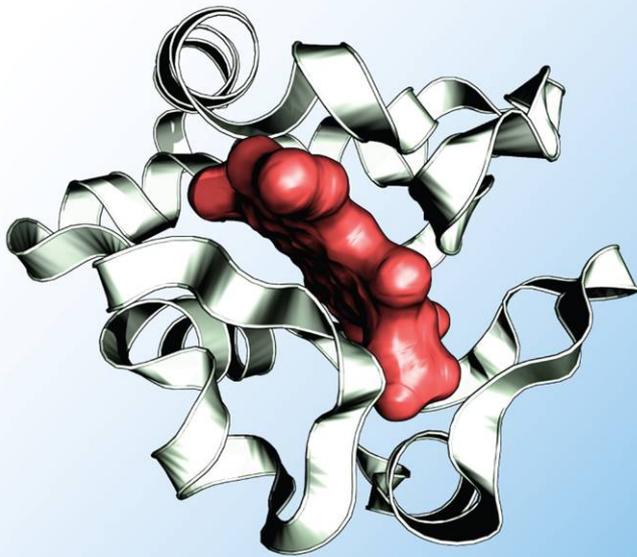
JILA and JQI contribute significantly to NIST and PL's core mission, by:

- Leveraging a Division of only 10–15 NIST scientists by participating as an equal partner in an institute with ~200 University scientists, postdocs and students;
- Providing a means of bringing in outstanding individuals who could not be hired under Civil Service procedures and salary limitations;
- Producing fresh generations of scientists dedicated to precision measurement (60 percent of JILA);
- Establishing a larger concentration of talent in synergistic disciplines than either institution could afford on its own.



IIIA

NISTCU



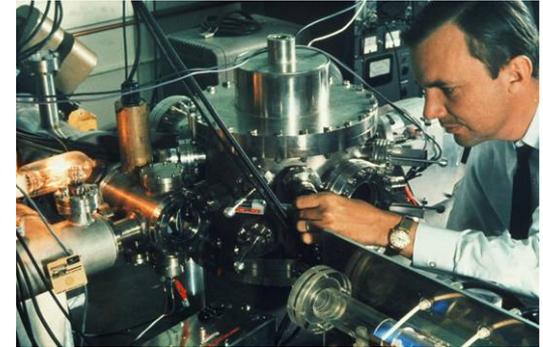
What is JILA?

- A joint research institute between NIST and the University of Colorado
- Physically located on the University campus
- 28 “JILA Fellows” (NIST and CU)
- NIST JILA Fellows hold “Adjoint” Faculty status with the University
- Approximately 250 personnel including Fellows, Research Associates, students (graduate and undergraduate) and staff

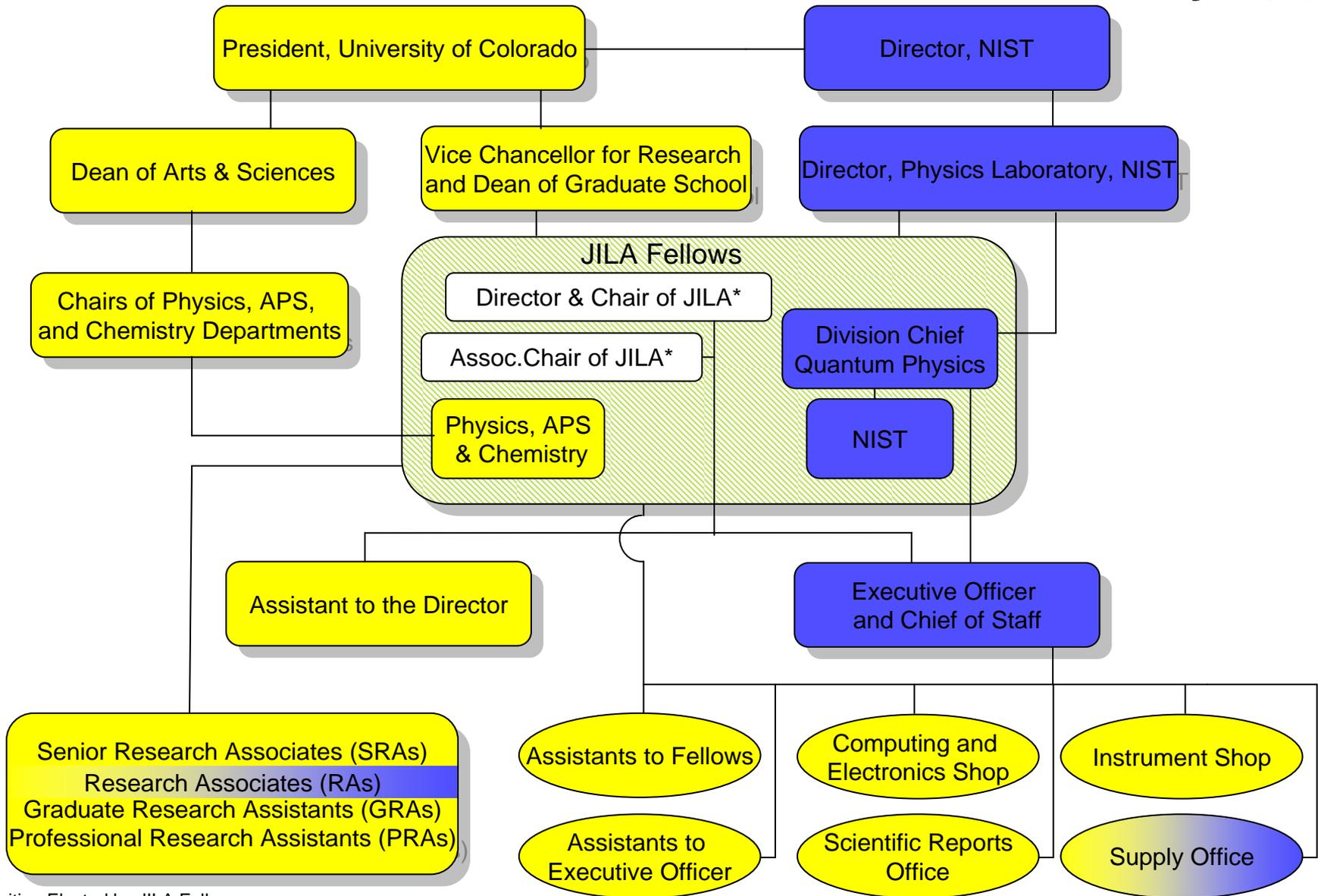


History

- Founded in 1962 as the “*Joint Institute for Laboratory Astrophysics*”
- Founding group of JILA Fellows led by Lewis Branscomb
- “Laboratory Astrophysics” never quite “jelled”
 - Although both astrophysicists and laboratory science are still present
- Name changed to just “JILA” in early 1990s (motivated in part by NBS → NIST)
- Today known as a leading center for
 - Atomic, Molecular, and Optical (AMO) Science
 - Measurement Science



JILA Organizational Chart

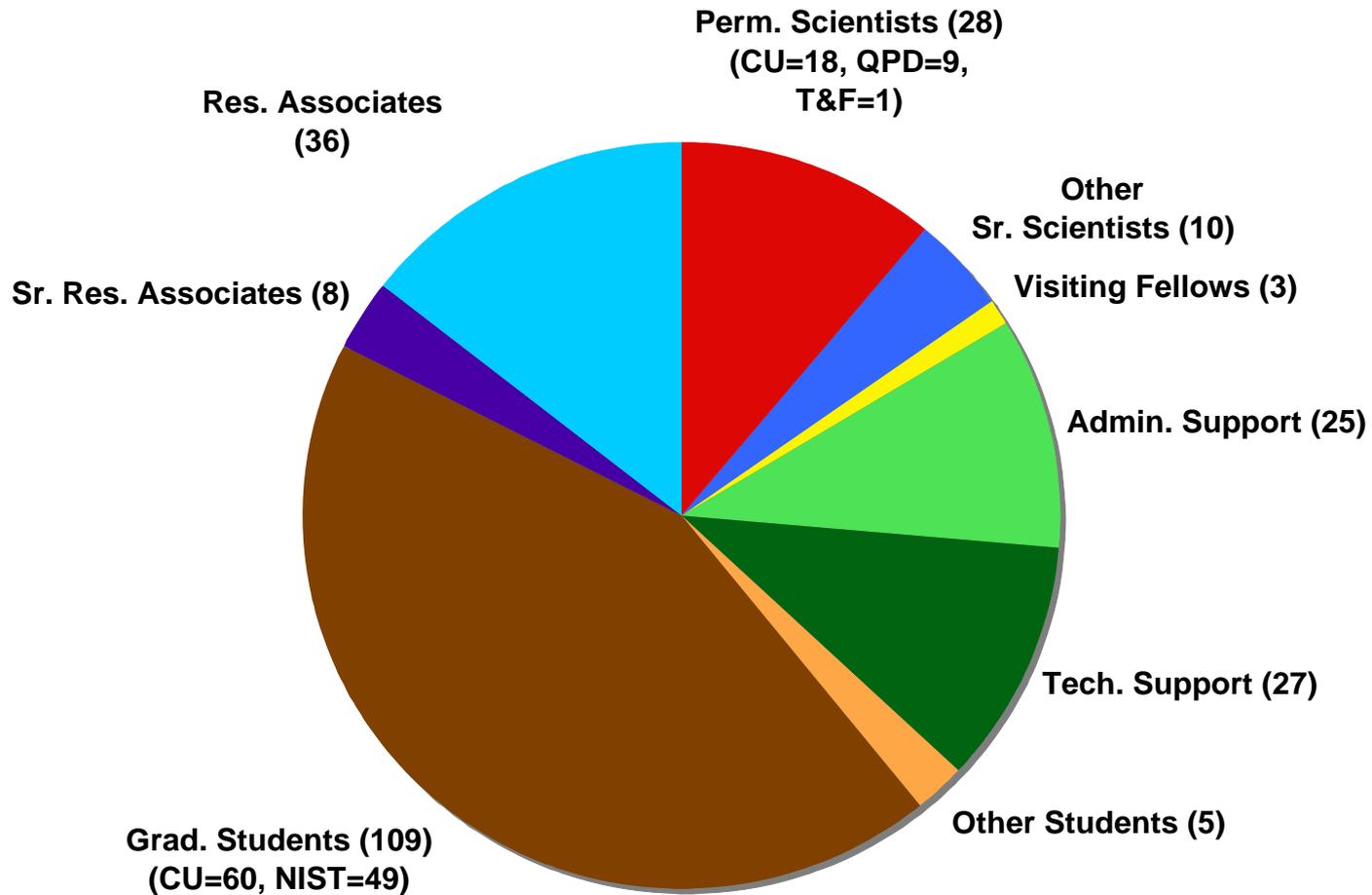


*Position Elected by JILA Fellows

JILA is a Joint Institute between the University of Colorado and the National Institute of Standards and Technology (NIST)

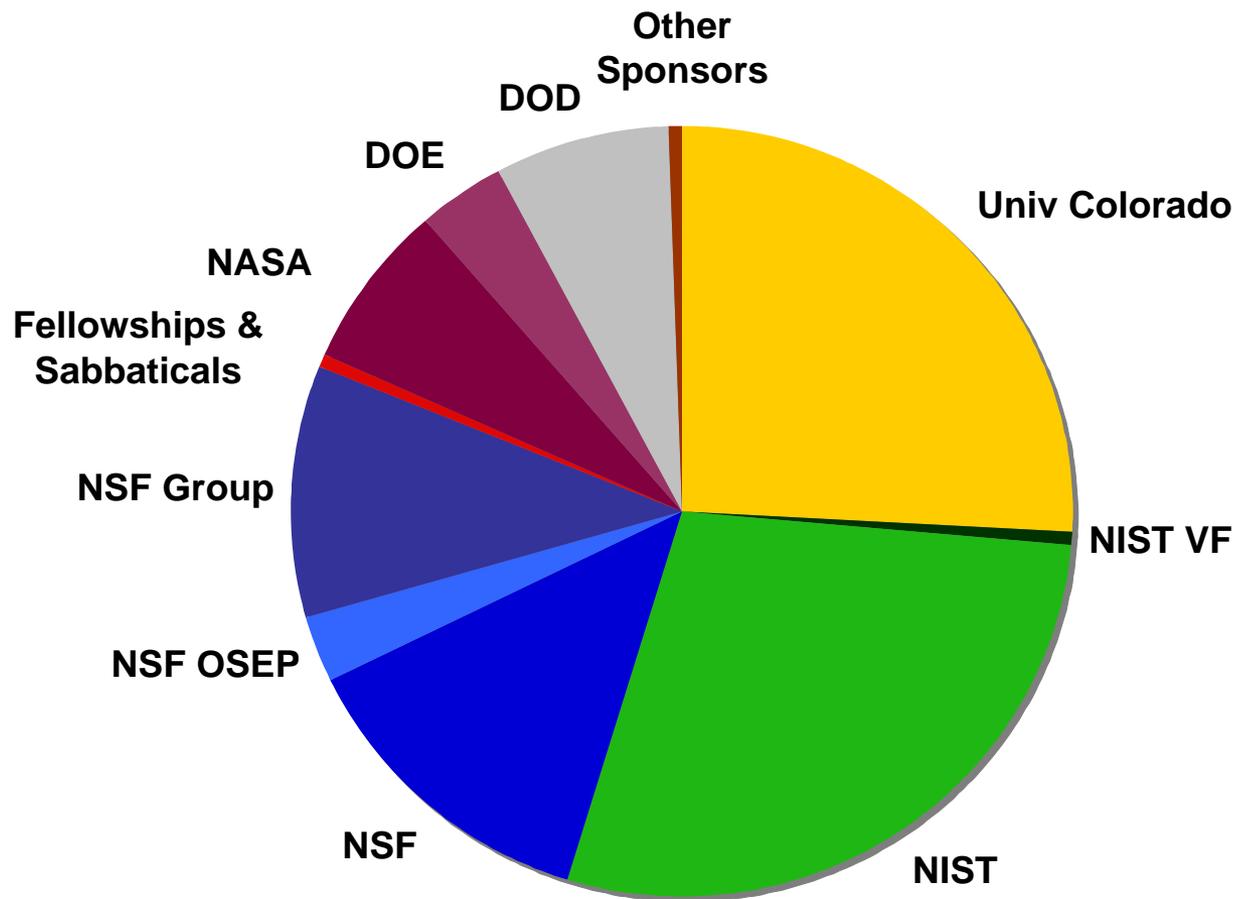
JILA Staffing 2007

Total FTE = 251



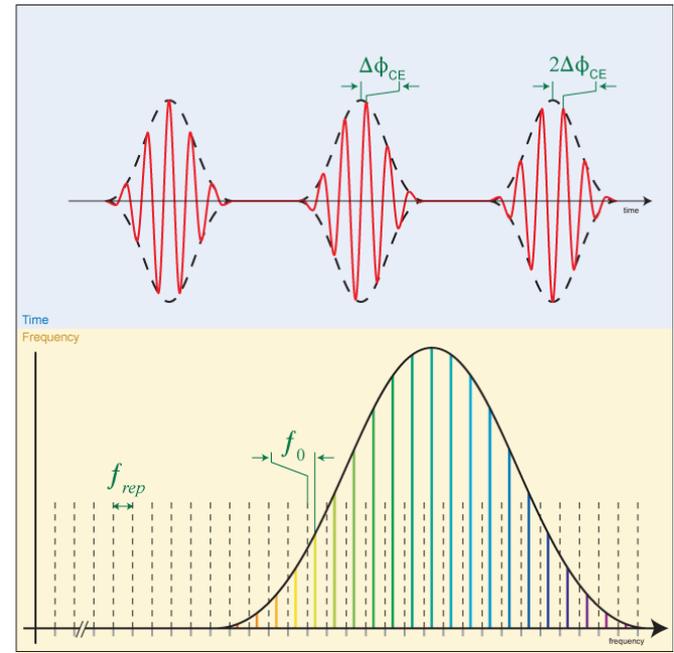
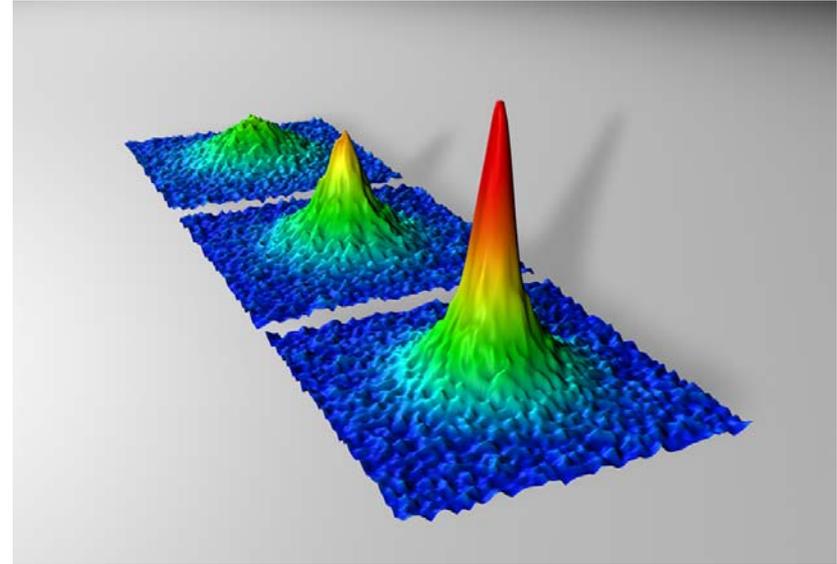
JILA Funding – FY 2007

Total = \$31,876,262



Strengths

- Leader in field of cold atoms
 - First Bose-Einstein condensate (1995)
 - First Fermi condensate (2003)
- Control of atoms with light built on measurement science expertise
- Leader in precision optical frequency metrology
 - 1970s, speed-of-light → redefinition of meter
 - 2000s, optical frequency combs



Recognition

- Six JILA Fellows are members of the National Academy of Science
- Many awards including
 - Two MacArthur Fellows
 - 2001 Nobel Prize in Physics (Cornell and Wieman)
 - 2005 Nobel Prize in Physics (Hall)



JILA is a Unique Training Ground for NIST



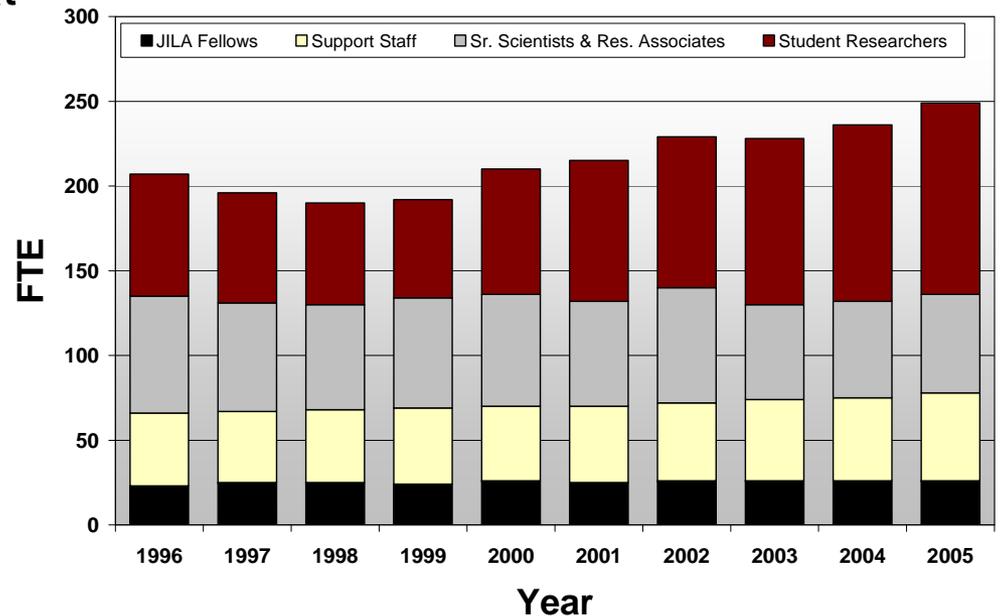
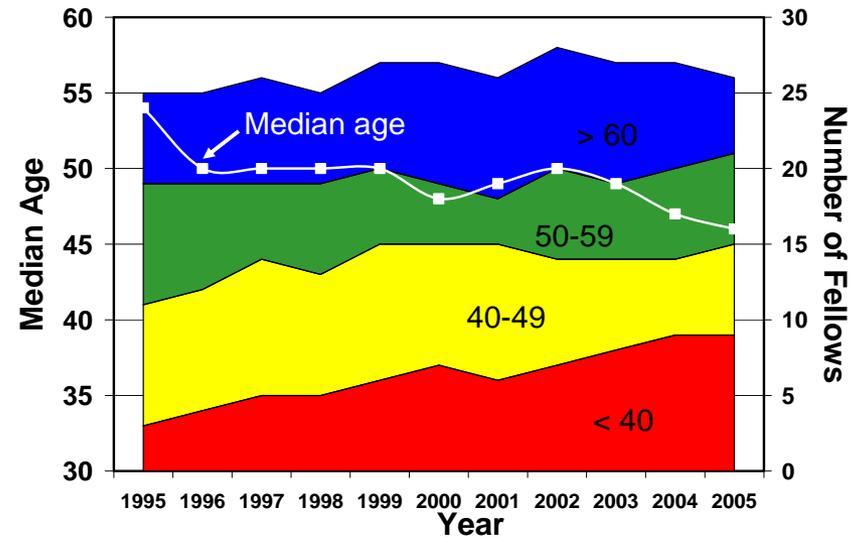
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Bergquist, Jim
Branscomb, Lewis
Burke, Jim
Burnett, Keith
Byerly, Rad
Calliccoat, Bert
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Chamberlain, George
Claussen, Neil
Clement, Tracy
Cornell, Eric
Corwin, Kristan
Davis, Scott
DeMarco, Brian
Diddams, Scott
Donnelly, Elizabeth
Dowell, Marla
Drullinger, Bob
Dunn, Gordon
Evans, John
Faller, Jim

Gallagher, Alan
Gallagher, Jean
Gebbie, Katharine
Gilbert, Sarah
Hall, John
Hammond, James
Heavner, Tom
Hollberg, Leo
Jefferts, Steve
Jelenkovic, Brana
Jin, Debbie
Jones, Mike
Jones, Richard
Kelleher, Daniel
Kieffer, Lee
Levine, Judah
Lykke, Keith
Magyar, John
Mirowski, Elizabeth
Mitchell, Jeffrey
Monroe, Chris
Myatt, Chris
Nadal, Maria

Nesbitt, David
Newbury, Nate
Newell, David
Norcross, David
Oates, Chris
Patrick, Heather
Plusquellic, David
Ramond, Tanya
Roberts, Jacob
Robinson, Hugh
Rumble, John
Schlager, John
Shwarz, Joshua
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Sinnott, George
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Van Brunt, Richard
Vogel, Kurt
Walls, Fred
Williams, Ed
Wood, Chris
Ye, Jun

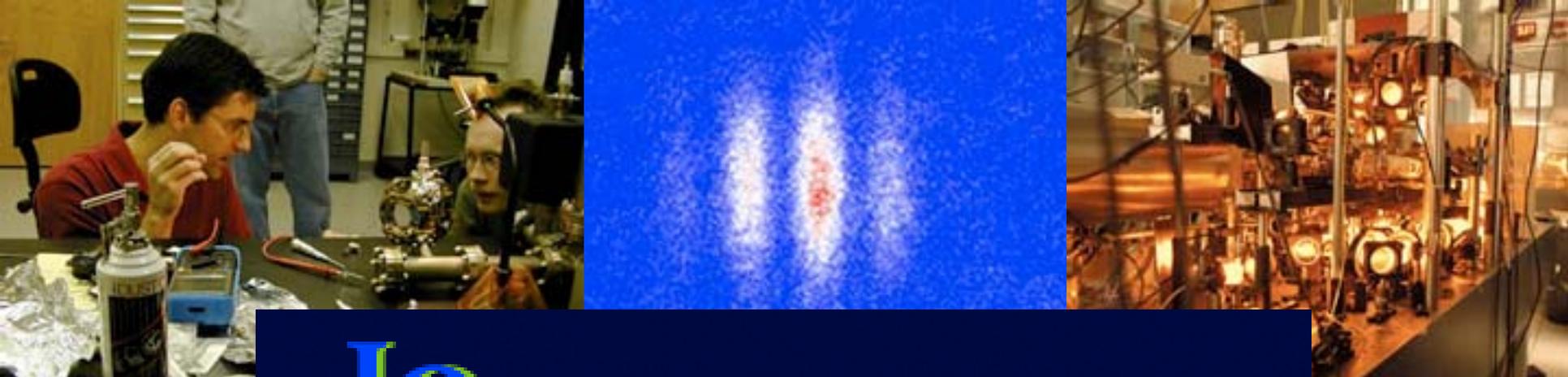
Renewal

- The founding JILA Fellows have retired over the last decade
 - “Generational” turn over
 - Fellows median age has actually **dropped** by 10 years in last decade
 - Generally recognized that JILA has successfully renewed itself
- Energetic “youngsters” have led to expansion of JILA’s size
 - mainly graduate student population

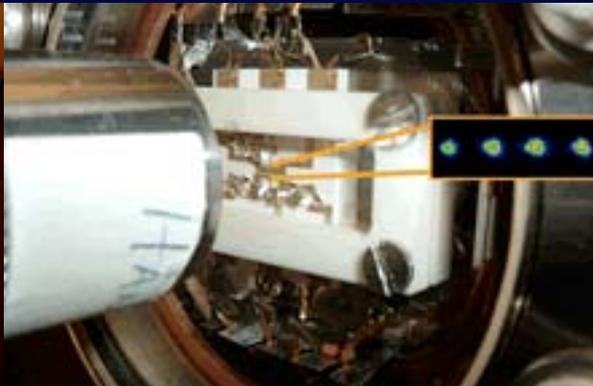
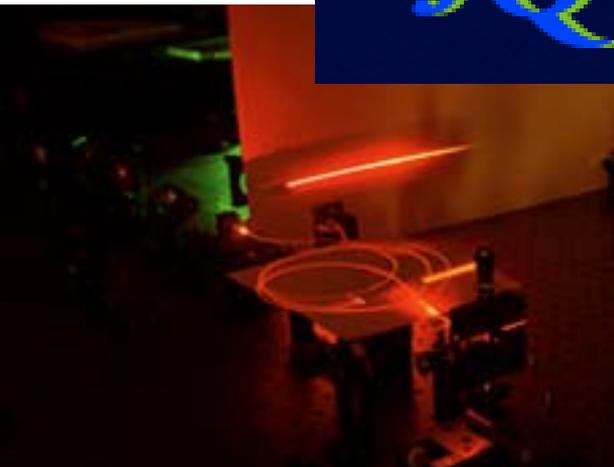


Proposed Solution





JQI Joint Quantum Institute



NIST
National Institute of Standards and Technology
Technology Administration, U.S. Department of Commerce



What is JQI?



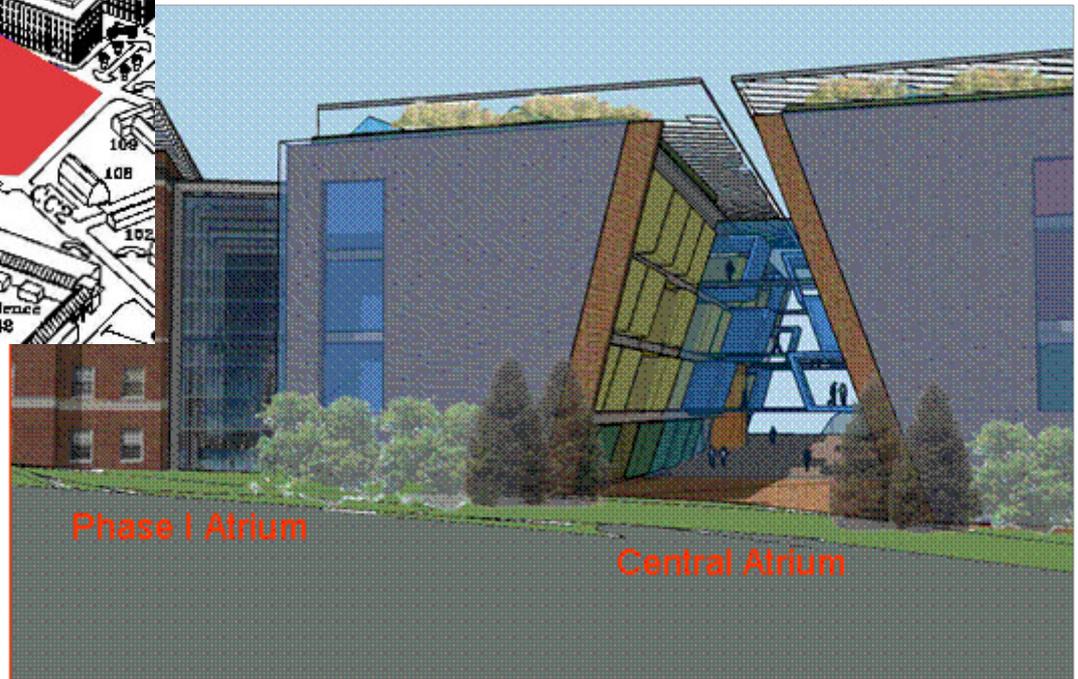
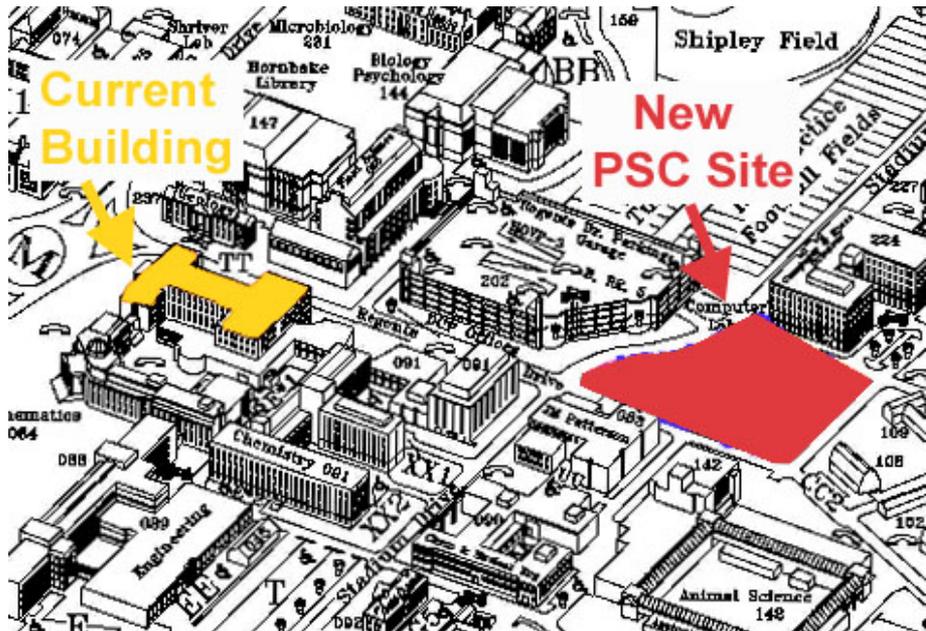
- A new institute between UMd, NIST, and NSA designed to exploit the strange aspects of quantum physics for the second quantum revolution
- \$6M annual budget; 23 voting fellows
 - $\sim\frac{1}{2}$ UMd; $\sim\frac{1}{2}$ NIST
- Modeled in part on JILA
- Combines AMO, condensed matter, and quantum information science in a single institute that builds on the strengths of NIST, UMd, and NSA's Laboratory of Physical Science
- Goal to create world class research institute for exploiting coherent quantum phenomena and to enhance the nation's role in exploiting this revolutionary new technology

What are the Areas of Research?

- Research theme: Coherent Quantum Phenomena
 - Interface of nanotechnology and quantum mechanics
 - Building of integrated nanodevices capable of creating, transporting, and detecting a single quantum excitation
 - Interface between the quantum and mesoscopic world
 - Control and entanglement of two or more different types of qubits or quantum systems
 - Quantum communications
 - Quantum measurement
 - Quantum computing/simulations

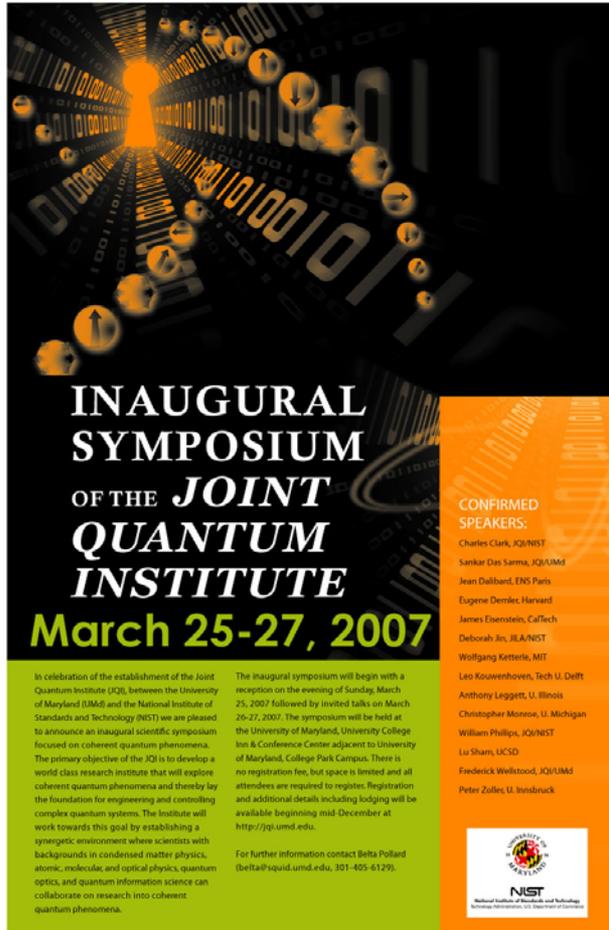


Building to House the JQI



Atrium Streets

JQI Inaugural Symposium



INAUGURAL SYMPOSIUM OF THE JOINT QUANTUM INSTITUTE
March 25-27, 2007

In celebration of the establishment of the Joint Quantum Institute (JQI), between the University of Maryland (UMD) and the National Institute of Standards and Technology (NIST) we are pleased to announce an inaugural scientific symposium focused on coherent quantum phenomena. The primary objective of the JQI is to develop a world class research institute that will explore coherent quantum phenomena and thereby lay the foundation for engineering and controlling complex quantum systems. The Institute will work towards this goal by establishing a synergistic environment where scientists with backgrounds in condensed matter physics, atomic, molecular, and optical physics, quantum optics, and quantum information science can collaborate on research into coherent quantum phenomena.

The inaugural symposium will begin with a reception on the evening of Sunday, March 25, 2007 followed by invited talks on March 26-27, 2007. The symposium will be held at the University of Maryland, University College Inn & Conference Center adjacent to University of Maryland, College Park Campus. There is no registration fee, but space is limited and all attendees are required to register. Registration and additional details including lodging will be available beginning mid-December at <http://jqi.umd.edu>.

For further information contact Bella Poland (bella@sqi.umd.edu, 301-405-4129).

CONFIRMED SPEAKERS:
Charles Clark, IQI/NIST
Sankar Das Sarma, IQI/UMD
Jean Dalibard, ENS Paris
Eugene Demler, Harvard
James Eisenstein, CalTech
Deborah Jin, JILA/NIST
Wolfgang Ketterle, MIT
Leo Kouvenhoven, Tech U. Delft
Anthony Leggett, U. Illinois
Christopher Monroe, U. Michigan
William Phillips, IQI/NIST
Lu Shao, UCSD
Frederick Wellstood, IQI/UMD
Peter Zoller, U. Innsbruck



Wolfgang Ketterle, Jean Dalibard, and Bill Phillips
Discussing Physics at the JQI Symposium